Code: CE4T3

II B.Tech - II Semester – Regular Examinations – May 2016

MECHANICS OF SOLIDS-II
(CIVIL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer *all* the questions.   All questions carry equal marks
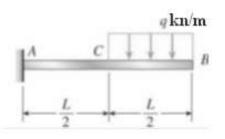
$$11 \times 2 = 22 \text{ M}$$

1.
   a) A cantilever beam AB fixed at A and carrying a load W at the free end B is found to be deflected by 'y' at the midpoint of AB. The deflection of B due to load W/2 at the midpoint in terms of 'y' is?
   b) State moment area theorems.
   c) Draw the Mohr's circle when a body is subjected to pure shear.
   d) What do you mean by principal stresses?
   e) Write expression for critical load using Rankine's theory.
   f) Differentiate between column and strut.
   g) State distortion energy theory for failure.
   h) Define thin cylinders and name the stresses set up in a thin cylinder subjected to internal fluid pressure.
   i) Write the significance of principal axes in unsymmetrical bending.
   j) What do you understand by shear centre?
   k) Write expression for longitudinal strain of a cylinder.

PART – B

Answer any **THREE** questions.   All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2.

   a) A beam of length 6m is simply supported at its ends and carries two point loads of 24kN and 20kN at a distance of 1m and 3m respectively from the left support. Find a) Deflection under each load b) Maximum deflection and c) the point at which maximum deflection occurs. $E = 2 \times 10^5$ N/mm^2 and $I = 85 \times 10^6$ mm^4.   **10 M**

   b) Use moment area theorem to find the rotation at the free end of cantilever beam shown below.   **6 M**

3.

   a) Rectangular block of material is subjected to a compressive stress of 120 N/mm^2 on one plane and a tensile stress of 50 N/mm^2 on a plane which is perpendicular to it with the shear stress for 100 N/mm^2 on the same planes. Find

      i) the magnitude of the principal stresses

      ii) the direction of the principal planes

     iii) the magnitude of the greatest shear stresses   **16 M**

4.

a) A bolt is subjected to an axial pull of 12kN together with a transverse shear force of 6kN. Determine the required diameter of the bolt by using i) maximum principal stress theory ii) maximum strain theory iii) maximum shear stress theory. Elastic limit in tension is 300N/mm^2, Factor of safety is 3, Poisson's ratio is 0.3   10 M

b) Explain various theories of failures.   6 M

5.

a) Determine the critical load of a long slender bar clamped at each end and subjected to an axial thrust on both ends.   12 M

b) Explain the failure phenomena of long columns.   4 M

6. Find the stress distribution at section ABCD of 300mm x 150mm as shown in the fig. If P = 64kN. Also locate the line of zero stress.   16 M